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Sonja Dahlgren and Martti Leiwo

Confusion of mood or phoneme? The impact of L1 phonology on verb semantics¹

The Greek texts from Egypt show extensive nonstandard vowel production, which could cause inadvertent confusion in e.g. Greek mood or case endings. This has previously been seen as evidence of a bad command of Greek, either because of internal phonological change or due to imperfect knowledge of Greek. On closer look numerous similarities to the nonstandard vowel production in Greek texts can also be found in native Egyptian texts. Greek loanwords in Coptic are treated according to Coptic phonological rules and show nonstandard vowel usage of the same nature that is present in Greek in some sociolects. The nonstandard spellings present evidence of underdifferentiation of Greek phonemes as well as transfer elements of the Egyptian prosodic system. The vowel usage is examined within the framework of L2WS (second language writing systems) studies, and evidence for the coarticulatory effect of the consonants on the vowels' quality is drawn from the field of articulatory phonetics.

Keywords: Ancient Greek phonology, Ancient Greek modality, Postclassical Greek, Coptic phonology, Language contact

1. Introduction

Egypt in the Roman period was a multilingual society with various levels of language contact. In addition to what had already been brought to Egyptian by the Persians, the Hellenistic rulers had made Greek the official language of Egypt, and it remained so even after the Romans took charge. For the Romans, Greek was a prestige language in Egypt (Adams 2003: 10–11) and therefore they saw no need to change the working language policy. Egyptian scribes were trained in Greek but the texts show a vast variety of phonological and morphosyntactic variation. It is evident that there were scribes with various levels of expertise, some completely bilingual, others with only the most basic ability to read and write the Greek alphabet, and copy from a model (for studies of the level of bilingualism in Egypt, see e.g. Vierros 2012: 33). The language use of the less educated scribes and private writers offers us

a glimpse into the phonological situation of Greek usage in Egypt. There are various aspects to consider. Thus far, the language-internal phonological development has been more or less the only linguistic reason considered, in addition to imperfect learning of Greek by the Egyptian scribes (Bagnall 2007: 21). Some nonstandard spellings have been attributed to the influence of Coptic (Egyptian) (cf. Gignac 1976: 55; Horrocks 2010: 112)² but for instance the numerous instances of vowel raisings have been connected almost conclusively to Greek *iotacism* (see further discussion in Dahlgren 2017). In this paper, we discuss the phonetic outcome of Greek vowel underdifferentiation (/y, u/) and unstressed vowels' reduction (/a, e, o/), and how these relate to the understanding of L2 Greek.

The raising of Greek front vowels caused the grapheme-phoneme correspondence to become irregular, differing from the close match in Classical Greek. This is a particular concern in Modern Greek in the feedback direction, i.e. from spelling to orthography (Protopapas & Vlahou 2009: 991). According to Horrocks (2010: 167–168), the situation of the 2nd to 3rd century Greek in Egypt was the same as in Modern Greek apart from the final raising of /y/ to [i].

Except for reasons caused by language internal development, nonstandard variation in the orthography has been regarded to result from lack of education and poor mastering of Greek (see e.g. Bagnall 2007: 16–17, 21 on the Narmouthis Greek collection). What we propose as one of the reasons behind the numerous misspellings is the impact of Egyptian phonology combined with transfer of some of the elements of the first language writing system (L1WS) to the second language writing system (L2WS). These effects have been considered both from the point of view of phonological impact as well as that of L1 orthographic conventions.³ To account for the impact of Egyptian phonology, the subject is approached within the study of coarticulatory phonetics.

The data presented here consist partly of private letters from the Eastern Desert of Egypt (O.Claud. 2) that may show potential prosodic and phonemic transfer from Egyptian, and partly of scribal documents from Middle Egypt (OGN I), which furthermore give evidence for underdifferentiation of foreign phonological units, specific in nature due to the impact of Egyptian. The corpora have been selected because of their geographic distance to one another,

² We use Horrocks (2010) as main reference for the Greek phonological development. Horrocks uses the earlier works on the subject by Gignac (1976) and Teodorsson (1974, 1977) as basis for his arguments but in addition to this enhances knowledge of especially the dating of e.g. the raising of front vowels to [i], and corrects some of Teodorsson's more advanced theories.

³ See Cook and Bassetti 2005 (1–56) for a good introduction to the various levels on which L1WS can have an effect on the outcome of L2WS production, often based on the phonetic level of L1.

showing that the phonetic variants are not local; both also display probably the most prominent Egyptian-induced phenomenon, the reduction of word-final vowels to schwa.

2. Contact-induced phonological variation

For the Egyptian writers of Greek, underdifferentiation of foreign phonemes and inadvertent transfer of the L1 stress system caused misperception of Greek phonology, visible in the many nonstandard graphemic variants of the Greek words. Related to the root and pattern morphological structure of Afroasiatic languages,⁴ the functional load of consonants was higher than that of vowels, as reattribution of vowel quality to that of the adjacent consonant may be important for perception, as stated in Traunmüller (1999). This is paralleled in the production of Northwest-Caucasian and Chinese schwa-like vowels, and the consonantal coarticulatory effects on these by place or manner of articulation, giving instant information on the consonants' articulation (Traunmüller 1999: 1–3). When Greek was thus treated according to the phonemic practices of Egyptian, valuable information of e.g. case endings and verbal modality was lost.

The graphemic variation in some Greek informal documents can be compared to that in Greek loanwords in Coptic, where variation shows similar tendencies in the nonstandard vowel production. The geographical areas from which the (Greek) materials are selected present distinct immigration settler patterns as well as different Coptic dialects but nevertheless, the results show similar patterns in nonstandard variation. This suggests that the phenomenon is not dialect-dependent but an overall outcome of a language contact between two structurally different languages. The outcome on the phonological level in this long-term language contact situation follows the general patterns of underdifferentiation of foreign phonemes and L1 phone substitution as presented by Weinreich (1963: 18–19). Matras (2009: 223–225) outlines a 4-scale structure on the types of phonological interference in contact situations. Following this scale we can suppose that the Egyptian users of Greek were on level A: Semi-bilinguals or monolinguals, or on level C: emerging bilinguals (the matter of placement of the Greek-Coptic contact on Matras's scale is discussed in more detail in Dahlgren 2017). On the level A of contact, as proposed by Matras (2009: 223–226), word-forms borrowed from the donor language are adjusted to the sound patterns of the speaker's mother tongue, which seems to be exactly how the L1 Egyptian writers were using L2 Greek;

⁴ The word formation principle on which the Afroasiatic languages operate is called 'root and pattern morphology'. Essentially it means that word formation lies on a so-called consonant root.

on level C, more typical patterns of bilingualism emerge. In addition to underdifferentiation of some Greek phonemes and substituting others with L1 phones, prosodic transfer from Egyptian is visible in the treatment of Greek unstressed syllables, the phoneme inventory of which often follow the Coptic phonological rules. The issue of phonological transfer is studied in detail in Dahlgren (2017); here we will provide information on how some of these features affect understanding of Greek morphosyntax.

3. Evidence for phonological transfer

Knowledge of Egyptian phonology and prosodic system is obviously imprecise, as for most of the language's history no graphemes for vowels existed in the writing system. However, by internal evidence from comparative Afroasiatic linguistics as well as by comparing Egyptian to e.g. Akkadian transcriptions of Egyptian words and phrases, some of the historic vowels and word stress patterns have been identified (Loprieno 1995: 29).⁵ What has thus been uncovered is that Egyptian had a strong word stress, and due to this heavy word stress, adjacent syllables were reduced in quality. The results of the reduction lay more heavily on vowels than consonants. This is typical of Afroasiatic languages, as consonants have a strong effect on the adjacent vowels (Girgis 1966: 75–76; Greenberg [1962] 1990: 433).⁶ The stress position in Coptic was typically on one of the last two syllables of the word, with the stressed syllable usually containing /o/, /ɔ/ or /e/ (Peust 1999: 270–273).⁷

Coptic unstressed vowels were usually marked with three letters, <a, e, o>, which reflects the tendency of unstressed vowels' reduction to /ə/, especially in word-final position, as described by Loprieno (1995: 48) and Peust (1999: 253). This seems to be a frequent phenomenon in the Greek texts written by Egyptian writers as well. Under the influence of their mother tongue, Egyptian scribes writing L2 Greek thus produced many nonstandard graphemic forms when depicting the Greek unstressed vowels' phonemic quality. In Greek, however, vowel quality was an important morphological marker, which native writers usually produced according to the synchronic standard in spite of the word stress position because of the fact that the information in, for example, case marking, lies on the last syllable.

⁵ In addition to that, Peust has compiled most of the study of Egyptian phonology (1999: 22–36).

⁶ A preliminary phonetic analysis of the consonantal environment related to the nonstandard vowel production is presented in Dahlgren (2016).

⁷ Earlier stages of Egyptian writing systems were consonantal, from Middle Egyptian (hieroglyphs) to Demotic (cursive writing, derived from hieroglyphs), so evidence for vowel quality is not easily attained. This changed with Coptic, the final stage of Egyptian, which used the Greek alphabet, and thus provides evidence for the quality of vowels in Egyptian.

Some changes in case marking, however, came to be standard in time. For example, the third declension plural accusative ending *-as* started fluctuating in Postclassical Greek, but the variation was already evidenced in some dialectal inscriptions as early as the 6th century BCE (Horrocks 2010: 223, fn. 7). It is, therefore, part of the analogous simplification pattern evident also in other parts of Greek morphology, and the ending was finally stabilised in *-es* levelling the accusative plural *-as* with the nominative plural in *-es* (Horrocks 2010: 117).⁸

According to Cook and Bassetti (2005: 36), L2 reading is generally easier if L1 and L2 writing systems use the same script, but writing L2 with the same script as that for L1 might also be a source of confusion due to L1 spelling conventions. On the other hand, both the phonology and the writing system of L1 might affect the spelling of the L2WS. Good examples of this are the Japanese learners' productions of L2WS English words, for example *recentry* 'recently' with the confusion between /l/ and /r/ as well as *yesuterday* 'yesterday' written with an epenthetic vowel according to the syllable structure of Japan (Cook and Bassetti 2005: 41–43). Both phenomena, the phonological level as well as that of spelling, are clearly visible in the L2 Greek texts produced by Egyptian writers. The usage of <e> in the place of Greek word-final /o/ is both in line with transfer from the (Coptic) Egyptian phonological system (the word-final vowel was most often /ə/) and the orthographic conventions (the unstressed vowel was typically marked with <e> according to e.g. Loprieno 1995: 48 and Peust 1999: 250).

In addition to the structural difference of the unstressed vowels' quality and position between Greek and Egyptian that caused variation on the orthographic level, i.e. the difference in the ability of keeping vowel quality distinct even word-finally, Greek also had more vowels than (Coptic) Egyptian did, for instance a fourth high front vowel /y/.⁹ The reconstructed inventory of Coptic phonemic vowels differs slightly from one researcher to another, but it is generally accepted that Coptic had the vowels /i, e, ε/ (Peust 1999: 201), if the Greek vowel graphemes presented quality, or /i, e, e:/, if quantity (Loprieno 1995: 46–48). It seems that Greek at this time had the following vowels: /i, y, ε, ø, e, a, o, u/ (Horrocks 2010: 167). Despite the slightly different vowel inventories given by Loprieno and Peust, it is clear that Egyptian had no /y/. Accordingly, there are clear instances of underdifferentiation regarding Greek /y/. Most often, this phoneme was graphemically depicted with the digraph *ou* <ou>, originally

⁸ See for example O.Claud. 2. 252: ἀσπάζου τοὺς φιλοῦντές σε πάν[τ]ες *aspázou toùs filoûnt-és se pánt-es* [Greet all your friends]. The standard accusative plural is <filount-as...pant-as>.

⁹ We mark the phonetic level [a], the phonemic level /a/ and the graphemic level (transliteration) <a>. After a form has been introduced, it will be referred to in transcription in *italics*. On the phonemic level, Greek original vowel quantity is ignored as it was no longer existent in the time period of the texts analysed here.

marking the Greek diphthong /ou/, which was pronounced as /u/ from the 7th century BCE onwards (Horrocks 2010: 161).

In addition to some more frequent variation, such as concerns, for example, *iotacism*, there is also other kind of nonstandard fluctuation regarding Greek /y/. The fact that some of the graphemic variation concerning this occurred between υ <y> /y/ and ου <ou> /u/, instead of other vowels such as η <ē> or ι <i>, is a clear indicator that for L1 Egyptian writers, these spellings represented the same phoneme, a back rounded vowel part of their own vowel inventory. Since Egyptian had /u/, it was an easy substitute on the high rounded vowel /y/, thus giving the spelling variation between υ <y> and ου <ou>, demonstrating underdifferentiation of Greek /y/ as /u/ (see below). In later stages of the Greek vowel raising, there was spelling fluctuation between υ, ι, οι, η <y, i, oi, ē> as all of these came to represent the same phoneme, /i/, the roundedness of /y/ having also disappeared at this point. This process of Greek front vowels' raising to /i/ started in the Ptolemaic period (323–30 BCE) but was completed only by early Byzantine times (from ca. 330 CE onwards [Horrocks 2010: 167]). Thus 2nd to 3rd century CE texts are rather early for υ <y> /y/ to be replaced with ι <i> /i/, and consequently, few instances of this particular variation occur in other texts than in the Narmouthis ostraca, OGN I (*Ostraca Greci da Narmuthis I*), which are written by Egyptian scribes and are one of the main sources for the variation between /y/ and /u/. The same variation exists, however, also in several ostraca from the Roman *praesidia* in the eastern desert of Egypt, where there likewise were many Egyptian L2 Greek writers (see e.g. Cuvigny 2013).

Underdifferentiation therefore seems to be the reason behind the vowel variation, for example, in the writing of the standard Greek word (1) πυροῦ <pyrou> /pyru/ 'of wheat' as πουργου <pourou> /puru/, indicating underdifferentiation of the Greek phoneme /y/, which has been replaced with the (Egyptian) rounded back vowel /u/.

(1) OGN I, 42

<u>Standard</u>	<u>Nonstandard</u>
πυροῦ /pyrú/ 'wheat (gen)'	<pourou> /puru/

However, the same word *pyroú* is written as ποιρου <poirou> in two other texts in the same collection, as shown in (2). This phenomenon is part of the Greek internal phonological development, as /y/ and /oi/ were in the Roman period in the process of merging, both

representing a rounded front vowel; according to Horrocks, /y/. The variation between υ <y> and οι <oi> is very frequent in the papyri of Roman Egypt (Gignac 1976: 197–199; Horrocks 2010: 167).¹⁰

(2) OGN I, 46, 86

<u>Standard</u>	<u>Nonstandard</u>
<i>pyrouí</i> /pyrú/	<poirou> /pyru/

On the surface level, writing <poirou> instead of the standard <pyrou> in (2) could be seen as evidence of the Greek internal phonological development affecting the writer. On first thought, it seems evident that the scribe must have been aware of the phonetic reality of Greek to be using <oi> to depict /y/. Then again, the scribe could have merely learned to write the word like this based on having read it in this form, written by native Greek writers. However, using both <ou> /u/ and <oi> /y/ for the standard /y/ represents strengthening evidence for the general difficulty in distinguishing the difference between /u/ and /y/, probably the more so for the phoneme occurring in the unstressed syllable.¹¹ That the effect of Greek internal phonological development was the factor behind these misspellings can furthermore be excluded on the basis of the intermixed usage of voiced and voiceless velar and dental plosives within the Narmouthis texts. This was among the most frequent transfer features from (Coptic) Egyptian to Greek in the Roman period, and proves that the writers of the texts were L1 Egyptians. (Coptic) Egyptian did not have a phonological opposition between these phonemes, but between voiceless stops and ejectives (Loprieno 1995: 43). Graphemic variation between /g, k/ and /d, t/ are therefore very frequently seen in Greek texts written by L1 Egyptians, and have been seen as an indicator of bilingualism and a consequence of (Coptic) Egyptian not having voiced plosives (Gignac 1976: 63, 82).

4. Confusion of form or phoneme?

In addition to underdifferentiation of Greek phonemes that were not part of the (Coptic) Egyptian phonemic inventory, there are instances of nonstandard marking of Greek vowels

¹⁰ For a nice example of this variation in the papyri of Fayum see, e.g., P.Fay. 112 and 114 written by the sender of the letters, Bellienus Gemellus, himself, compared to P.Fay 110 written by a scribe for him. Gemellus has difficulties in spelling this phoneme, whereas the scribe does not make mistakes.

¹¹ The issue of /y, u/ underdifferentiation and the phonemic quality of <oi> and <y> is discussed in detail, including its relation to especially early Roman period Greek in Egypt, in Dahlgren (2017: 68–82).

that seem to be due to (Coptic) Egyptian prosodic influence. A frequently occurring example of this involves the marking of Greek /a, e, o/ in unstressed syllables. In Greek these were distinctive phonemes and, furthermore, bore morphological meaning, e.g. marking the mood of verbs, for instance distinguishing the active aorist infinitive πέμψαι <pempsai> ‘to send’ from the active aorist imperative πέμψον <pempson> ‘send’. The mood-marking phoneme here is syllable-final.

In native Greek writings outside of Egypt, while there were some spelling errors related to the orthographic depth¹² of the Greek alphabet, reminiscent of e.g. native English speakers’ phonetically-based nonstandard spellings such as *wierd* vs. *weird*, *point of you* vs. *point of view* i.e. using graphemic variants that are pronounced the same (in Greek mostly related to the various phonemes on their way to raising to /i/), mood-marking vowels mostly followed the standard (see also Leiwo 2017). Either they were phonetically distinct enough or learnt by heart in their graphemic form due to their morphosyntactic importance because otherwise Greek infinitive and imperative forms, for instance, might get confused with one another as in the examples regarding *pempse* below. Roman-period evidence of phonological and graphemic variation in Greek verbal morphology mostly comes from the papyri and ostraca in Egypt due to the fact that the climate was nowhere else sufficiently dry to preserve documents written on papyrus, so the material evidence cannot be regarded with absolute objectiveness.

Nevertheless, in the Greek stone inscriptions there are hardly any spelling errors related to the confusion of different moods with one another, whereas in the Roman Egypt there is abundant evidence of graphemic variation of this sort that, as a result, appears to suggest confusion of mood; certainly, the inscriptions have nothing as distinctive as the variation between /e/ and /o/ as there was in Egypt. This is regardless of the fact that in many ways, mostly in relation to *iotacism*, phonological development was more advanced in 4th century BCE Athens than it was in Graeco-Roman Egypt; according to Teodorsson (1974: 286–299), *iotacism* was already well advanced in the “majority system” ca. 350 BCE with ι, ει, η, ηι, υ, υι <i, ei, ē, ēi, y, yi>¹³ having been raised to /i/, monophthongisation was complete, and the stress system had changed to a primary stress one. According to Horrocks, however, this is an exaggeration, to be pushed forward by at least a century – especially regarding the vowel

¹² Orthographic depth means the grapheme-phoneme correspondence. In English, e.g., where a phoneme might be written with many different graphemes, it is deep; the writing system of English is phonologically opaque. In languages like Italian and Finnish, where there is a simple correspondence between a phoneme and a grapheme, it is shallow: these are phonologically transparent writing systems (the term ‘writing system’ here meaning orthographic conventions specific to a language) (Cook & Basseetti 2005: 6–7; Aro 2004: 10).

¹³ ει <ei> only before a consonant or word-finally.

quantity loss and the change in stress system, as well as the raising of η, υ <ē, y> to /i/ (Horrocks 2010: 165). The Athenian majority system, even more cautiously interpreted, was at any rate more developed than the variety the Macedonian conquerors brought with them to Egypt. In Egypt, the Ptolemaic elite introduced a more archaic form of the language as the official language of the court, with aspects taken from Old Attic phonology; while this language form also started developing toward what we see in Modern Greek, it was still more conservative to begin with than even the spoken variety of Athens in the 4th century BCE, as presented above. The development started again in Egypt, only reaching the more advanced level of 4th century BCE Athens in the late Roman period (Horrocks 2010: 165–167).

As we have argued above, the /o, e/ variation in Egyptian Greek is probably caused by the tendency of (Coptic) Egyptian unstressed vowels’ reduction to schwa. This feature, related to the impact of the phonological level of Egyptian, caused confusion between /e/ and /o/ in some Greek verb forms and resulted in uncertainty of the verb form’s intended meaning between e.g. infinitive and imperative (Leiwo 2017). Examples from Petenephotes, a writer of several private letters on ostraca, give a detailed insight into the general phenomenon. Petenephotes uses four different variants of the verb πέμπω <pempō> ‘send’, all in a syntactic context of a request (see Leiwo 2010, 2017).

Table 1. /o, e/ variation in O.Claud. 2¹⁴

<u>Standard Greek</u>	<u>Petenephotes’ production</u>	<u>Egyptian pronunciation</u>
<i>pémp-son</i> ['pempson]	<pempson>, <pempsōn>	['pempsə]
send.ACT.AOR.IMP.2SG	<pempsen>	['pempsə]
<i>pémp-sai</i> ['pempse]	<pempse>	['pempsə]
send.ACT.AOR.INF		
<i>pémp-e</i> ['pempē]		
send.ACT.PRS.IMP.2SG		

The most popular form of asking someone to do something in Roman Egypt was to use a politeness phrase, such as καλῶς ποιήσεις <kalōs poiēseis> ‘please’ with the active aorist participle. However, many letter writers started to use either the active aorist imperative, the

¹⁴ O.Claud. 2.243, 3 πέμψε <pempse> and 11 πέμψον <pempson> ; 246, 4 πέμψε <pempse> , 6 πέμψεν <pempsēn> , 249, 8 πέμψων <pempsōn>. The form πέμψεν <pempsēn> is attested also in a letter of Maximus (O.Claud. 2.262, 3): γράφεις μου ὅτι πέμψεν μου φάσιν ἀπὸ τοῦ [=τῶν] ἐς ὅκον *gráphis my hōti pémpsēn my phásin apò tôn is ýkon* [You write to me that “send me word about those at home”]. All the forms are glossed in Table 1.

future indicative or the aorist infinitive instead of the participle (see Leiwo 2010). The aorist stem of the verb <pempō> ‘to send’ is *pemps-* with the first aorist formation suffix *-s-*.

The first aorist active infinitive ends in *-ai*, at the time of the text pronounced [e], whereas the 2nd person aorist active imperative ends in *-on*. Furthermore, the present 2nd person active imperative ends in *-e* as does the 2nd person active imperative of the aorist 2, for example λαβέ <labe> ‘take’ from the verb λαμβάνω <lambanō>.¹⁵ All of these forms create difficult morphology for the L2 speaker. Loss of word-final /n/ was also a widespread phenomenon in Greek texts at this time (Gignac 1991: 187; Horrocks 2010: 171), which added to the confusion on the phonetic level. In addition to these, there was the phonetic merger between unstressed /e/ and /o/ with the Egyptian L2 Greek users. As a result, to a L2 Greek speaker of an Egyptian origin, all of these forms probably represented the phonetic form [‘pempsə]. This might also be related to a psycholinguistic aspect, the so-called rule-processing reasoning, which functions so that only one imperative morpheme {(s)e} is activated in a person’s mind (Leiwo 2005: 252–253). The form is, thus, psycholinguistically always the same [‘pempsə] but its spelling has variation due to the irregularity (i.e. depth) of the L2 writing system, combined with the writer’s imperfect Greek (orthographic) skills, which on the practical level resulted in trying different orthographic variants. As can be seen from above, there is a strong element of multicausality to the phenomenon.

Generally, the infinitive was more seldom used in similar syntactic contexts. Furthermore, confusion of the morphological forms between infinitives and imperatives of the type *pempse* and *pempson* (IMP) and *pempsai* (INF), with the writer not recognising the difference between the imperative and the infinitive, was not at all usual. On the contrary, the majority of the writers did recognise the difference (Leiwo 2017). Petenophotes’s form *pempse* could be interpreted as an infinitive (*pempsai*) since <ai> was pronounced [e] in standard Greek pronunciation. Therefore, taking into account that the word-final /e/ was unstressed and probably reduced to schwa, both forms were pronounced [‘pempsə]. However, from the semantic and syntactic context it seems more likely that Petenophotes did not change the syntax in his very stereotypical letters but is using the imperative in each instance. Accordingly, the outcome of seemingly different forms is due to simple spelling problems, confusing [e] and [o] in the word-final, unstressed position due to the impact of Egyptian (see the table above for the phonetic level confusion). Another issue that speaks in favour of the

¹⁵ Second aorist is a traditional name for the aorist of the verbs that have apophony. The aorist 2 has the same endings as the present, whereas the first aorist has its own aorist endings together with a stem morpheme {s} (it can have some other formations as well, but they are not important here).

imperative is the fact that Petenephotes never uses the spelling *pempsai* that is the standard form of the active aorist infinitive, and also used by other writers in the same social context.

One more suggestion supports this explanation: Greek verbs borrowed to Coptic were taken in the infinitive form which was altered, thus becoming identical to that of the 2nd person singular Greek imperative (Layton 2007: 126, 155). According to Grossman & Richter (2017), there was variation in the manifestation of the Greek infinitive in Coptic dialects between the endings *-in* and *-e/i*. This has to do with the gradual loss of the final *-n* from the bare verbal stem in some dialects, leaving the form similar in appearance to the imperative form mentioned above (Grossman & Richter 2017: 208–223). Furthermore, in most native Coptic verbs, the imperative form was the same as that of the infinitive (Layton 2007: 90). The polysemy of the infinitive and imperative in Coptic, regarding both the Greek loan verb borrowings as well as the native Coptic ones, no doubt enhanced confusion in the usage of Greek imperatives.¹⁶

In the verb forms in Table 1, the standard unstressed <o> has been replaced with <e>, thus being in line with Coptic orthographic practices for marking the unstressed syllable's vowel. As regards the nonstandard vowel depiction in the Greek verb usage, all of the evidence points toward L1 phonological transfer which was perhaps further strengthened by the polysemy of Coptic infinitive and imperative. The same type of variation is found in OGN I, 115 *κερασεν* <kerasen> from the standard *κέρασον* <kerason> 'to mix (imp.)', from far across the country to the examples of O.Claud. from the Eastern Desert; therefore the variation was not idiosyncratic to one scribe, nor a product of a local variety. Further evidence that these nonstandard forms result from the impact of Egyptian phonology is the fact that transfer of (Coptic) Egyptian phonology was not limited to verbs, it also had effect on nouns, as in *pourou* for *pyrou* in (1–2). This is even more transparent in (3) in the nonstandard form *κηπεν* <kēpen>, the accusative singular of the noun *κήπος* <kēpos> 'garden', as the nonstandard vowel variation occurs between /o/ and /e/ similarly to the above-mentioned nonstandard verb forms *kerasen* (from *kérasen*) and *pempsen* (from *pémpsen*).

(3) O.Claud. 4.892, 6–7

Standard	Nonstandard
<i>kēpon</i>	<kēpen>
garden.ACC	garden.ACC

¹⁶ Although 2nd–3rd centuries CE are a bit early to talk about Coptic proper, it seems reasonable to assume that this applies even before extensive use of it. The Narmouthis Demotic (Egyptian) ostraca from the same collection contain Greek loan verbs treated in this way.

This example (3) produces the same type of phonologically-based nonstandard graphemic variant which again affected the Greek unstressed syllable's vowel. The evidence presented above suggests Egyptian phonological impact on the treatment of Greek syllables. It is clear that the L1 Egyptian writers, when deviating from the standard Greek orthography, marked the Greek unstressed syllable according to Egyptian prosodic rules, which dictated a limited vowel inventory in the unstressed syllable. The unstressed syllable was then characterised in the manner of Coptic orthographic practices, with especially the word-final unstressed vowel in the graphemic form <e>, which was the most usual grapheme for depicting the word-final schwa. Nonstandard vowels in other positions were often written with any one vowel from the unstressed vowels' inventory best describing the assimilation to the adjacent consonants quality, such as /a/ from /e/ in vicinity of velar consonants or /r/, which will be discussed in the next section.

5. Coptic treatment of Greek loanwords: consonant-to-vowel coarticulation

As we will see in the examples below, the phenomenon present in Petenephotes's use of unstressed Greek /a, e, o/ is paralleled in the Coptic usage of Greek loanwords.¹⁷ Most of the written Coptic sources are from a later period than the Greek texts presented here as Coptic texts appear in larger quantities only from 4th century CE onwards; however, there is a 3rd century CE Coptic magical text from Soknopaiou Nesos near Narmouthis (Choat 2006: 30–42). Therefore, some form of (Old-)Coptic was written earlier than is generally assumed. In addition, as some of the linguistic features present in Coptic are already visible in earlier stages of Egyptian (see. e.g. Rutherford 2010: 204–206 on auxiliary verbs in Demotic), it is reasonable to assume that Coptic shows the phonological status that was existent already before the standardisation of Coptic.

Coptic orthography strived for an almost phonetic representation of the spoken reality of the language. One of the orthographic conventions was the graphemic marking of allophones. If, for instance, in a (Greek) word there was the sequence /np/, this was written <mp> because of the effect of the bilabial on the nasal (Layton 2000: 20). Following this principle, the vowels were marked into the graphemic form that was close to their phonetic realisation. Unstressed /a, e, o/ were often intermixed in Greek loanwords, as we can see in

¹⁷ Many more examples such as the ones presented here can be seen in Girgis (1966) and Dahlgren (2017).

(4) and (5), compared again with the Greek usage of the documents in OGN I (6), and the letters of Petenephotes (7). From the geographical distribution of the examples we can argue that the phenomenon is not dialectal but caused by the dissimilar language structures.

(4) Codex Schøyen. 14 (4th cent. CE)¹⁸

Standard ¹⁹	Nonstandard	Location
<i>t^herapeúō</i>	<t ^h arapeuē>	Middle Egypt
‘to be an attendant, do service’		

(5) P.Ryl.Copt. 275 (3rd cent. CE)

Standard	Nonstandard	Location
<i>aksioú</i>	<eksiou>	Hermopolis/Upper Egypt
‘to neglect’		

(6) OGN I, 115 (2nd–3rd cent. CE)

Standard	Nonstandard	Location
<i>kérason</i>	<kerasen>	Fayyum/Middle Egypt
‘to mix (imp.)’		

(7) O.Claud. 2 (2nd cent. CE)

Standard	Nonstandard	Location
<i>pémpson</i>	<pempse(n)>	Mons Claudianus/Eastern desert
‘to send (imp.)’		

<t^harapeuē> in (4) is a nonstandard form of the Greek loanword θεραπεύω <t^herapeuō> ‘to be an attendant, do service’, with a change from the standard /e/ on the first syllable to /a/. The Greek stress is on the third syllable, and if it is assumed that the Greek stress was retained, it may be seen that the vowel depicted with a nonstandard grapheme is again unstressed. An explanation for the use of α <a> may be found in the Coptic phonology. Coptic could have word-internal unstressed /e/ but often this was just a graphemic variant for a non-phonological

¹⁸ Analysis of nonstandard orthography in Greek loanwords in Coptic manuscript editions used for (4), (5) courtesy of DDGLC (Database and Dictionary of Greek Loanwords in Coptic), FU Berlin.

¹⁹ ‘Standard’ means the orthographic form of the word in Standard Greek, as this was usually how the word was borrowed into Coptic. ‘Nonstandard’ means a written variant deviant from this.

vowel value, especially near a sonorant (Peust 1999: 250–252). It was probably, as a neutral vowel, affected by the nearby consonants’ quality. The choice of α <a> replacing the standard Greek original ε <e>, therefore, could be explained by the presence of /r/; those coronals that are produced with a more retracted tongue body, like retroflexes, may cause retraction of the adjacent vowels (Flemming 2003: 336).

Coptic /r/ has been described as [r] by Peust (1999: 128) and [ɾ] by Loprieno (1995: 33), so the pronunciation probably was not as far pushed as that of retroflex, but it might have been palato-alveolar. A possible comparison of similar phonetic realisation of a consonantal quality on an adjacent vowel that seems to be typical of Afroasiatic languages is found in modern Arabic, in which /q/, pharyngeals and /r/ cause retraction of /a/ to [ɑ] (according to Abd El-Jawad 1987, emphatic i.e. pharyngealised /r/ exists across all varieties of North African Arabic), while (other) coronal consonants cause fronting of vowels. It is generally assumed that Egyptian had emphatic consonants, and one of the phonetic realisations of this may have been retroflexion (Peust: 1999: 82–83). In either case, /o/ might have been retracted to /ɑ/ (even [ɑ]) by the adjacent /r/. Further proof of vowel retraction to /ɑ/ in combination with /r/ seems to be the attestation of the Greek loanword ἐργάτης <ergatēs> ‘workman’ in Coptic written as <argatēs> (attestations in Girgis 1966: 75).

However, this change was not typical of Greek loanwords in Coptic, as /r/ mostly seems to cause fronting and raising of /a/ but /e/ is nearly always retracted to /ɑ/; together these seem to point toward a tendency of centralising unstressed vowels in general. Coptic dialects usually had the vowels /a, i, u, ə/ in word-internal unstressed position (Peust 1999: 252). It is therefore plausible to assume that the (possibly) retracting effect of the adjacent /r/ might have caused the writing of what was essentially a schwa with <a> to give it a more retracted colour (cf. Dahlgren 2017: 94–97).

Essentially, the situation with *t^harapeuē* is mirrored by *kérasōn* being written as <kerasen> in (6) in that the unstressed vowel is treated as schwa. In *kerasen*, the unstressed final vowel has taken the assumed phonetic form of /ə/, as it has in Petenephote’s variant *pempsen* from the standard form *pémpon* in (3), again in (7). It is evident that the unstressed vowels’ quality in both Greek examples follow the prosodic rules of the writers’ L1, Egyptian, which is in line with the phonetic ambitions of Coptic orthography.

In <eksiou> in (5), the unstressed vowel’s quality in this phonetically-based graphemic form has resulted in <e> from the standard <a> in the Greek loanword ἄξιον <aksiou>. There is some evidence in the world’s languages that velar consonants can cause fronting, phoneme-specifically. In the South Wakashan language Ditidaht (spoken in Canada), velar consonants

generally cause strong fronting on the low vowels apart from the central vowel /a/ [ə~ɑ], which shows strong retraction. The high vowels, on the other hand, show strong retraction, especially /i/. In the Ditidaht vowel inventory, therefore, [ɑ:] tends to be fronted by the effect of adjacent velar consonants (Sylak-Glassman 2014: 22, 30).

According to Peust (1999: 201) the phonetic quality of Coptic <a> is [a]. When compared to, e.g., Ditidaht, its closest phonemic equivalent in the vowel inventory of that language is probably /e/ [ɛ~æ] or /e:/ (/ee/ in the Ditidaht system) [æ], as Ditidaht has no [a]. However, in Ditidaht /e/ is fronted when it is adjacent to velars and /ee/ is raised and fronted. This seems to be perfectly in line of what seems to be happening to Greek /a/ in the Coptic system, when /a/ is adjacent to a velar consonant, being thus part of an apparent overall tendency of vowel assimilation to the velar place. Indicators of exactly the same phenomenon have also been found in American English by Hillenbrand et al. (2001: 754), with a slight upward shift for back and central vowels, especially if the consonantal environment is initial instead of final.

6. Conclusions

Greek papyri and ostraca from Egypt present a rewarding case for studying contact-induced variation in vowel quality. The evidence comes from written material only, but with the aid of articulatory phonetics and L2WS studies, the nonstandard vowel variation, as it is preserved in the graphemic form, can be analysed in reference to the phonological systems of the languages in contact.

Greek and Egyptian were structurally very different in one crucial respect: in line with the typical Afroasiatic word formation structure, the functional load of consonants in Egyptian was higher than that of the vowels. Greek, on the other hand, preserved vital information of morphology in vowels. Furthermore, Egyptian had a strong stress accent that caused reduction on the vowels of unstressed syllables, especially final ones, and final syllable is the position in which the Greek inflectional information mostly lies. An example of this can be provided in the standard Greek *pemp̄sai/pemp̄son*, where the difference of either an infinitive marking or that of an imperative is distinguished in the final syllable. Consequently, in the variant spellings followed from the inadvertent transfer of Coptic phonological rules, accurate information of e.g. Greek case endings or mood was lost.

The examples presented in this study show that e.g. variation between Greek /o/ and /e/ results from the fact that there was no stressed /o/ in the Coptic unstressed vowels' phonemic

inventory, and that the Coptic neutral vowel was most often depicted with <e>, according to the Coptic orthographic conventions. This lead to a grapheme-based confusion, where the intended Greek mood is not always recognisable in some Greek verb forms. Parallels can be drawn for the same phonetically-based phenomenon from Greek loanwords in Coptic, as they were attempted to be integrated within the native language phonology resulting in writing forms similar to the nonstandard vowel usage of Greek texts produced by L1 Egyptian writers.

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Abbreviations

The glosses follow Leipzig Glossing rules.²⁰

AOR – aorist

ACT – active

L1/2 – First/second language

L1/2WS – First/second language writing system

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